

STATEMENT OF BASIS

For Proposed Permit Limits (Permit Renewal)

PERMITTEE: City of Fort Benton
PERMIT NO.: MT0021601

RECEIVING WATER: Outfall 001: Missouri River
Outfall 002: Missouri River

FACILITY INFORMATION:

Mailing Address: P.O. Box 8
Fort Benton, MT 59442

Contact: Tim Farwick, Utilities Superintendent

Telephone: (406) 622-5494

FEE INFORMATION

Number of Outfalls: two (2)
Type of Outfall: 001(Missouri River) – Treated domestic wastewater
002 (infiltration to Missouri River) - Treated domestic wastewater

I. Permit Status

This is a renewal Montana Pollutant Discharge Elimination System (MPDES) permit for the City of Fort Benton wastewater treatment facility. The previous permit was issued on August 1, 1996 and expired on April 30, 2001. The permittee submitted an MPDES permit application and application fees to the Department of Environmental Quality (Department) on October 19, 2000. Pursuant to AMR 17.30.1313 the expired permit remains effective until the renewed permit is issued.

II. Facility Information

a. Facility Description

The permittee operates a three-cell aerated lagoon facility that continuously discharges directly to the Missouri River or to an infiltration pond. The Statement of Basis for the previous permit stated that the infiltration pond is hydrologically connected to the Missouri River (Figure 1). The existing facility consists of three aerated lagoon cells. The facility was upgraded in 1991 from a two-cell facultative, non-discharging lagoon system. The first cell of the former facultative system was retrofitted and contains three aerated cells. The second cell of the former facultative facility remains, as built, and serves as an infiltration pond. The infiltration pond is adjacent to the aerated cells and situated

approximately 175 feet from the Missouri River. It is part of the facility disposal system, as described in the renewal application and the operation and maintenance manual. The infiltration pond is entirely on City owned property and fenced from public access. Biosolids were not removed during the 1991 upgrade.

Effluent discharge from the facility is continuous. Discharge flow rate is measured with a V-notch weir and staff gauge in the effluent control manhole. Flow to either outfall is controlled at the effluent control manhole. The third cell is equipped with two outlet lines designed to allow for multi-level draw-off. Discharge to the Missouri River has only occurred once since 2001. A line-drawing of the process is shown in Figure 2.

The facility is not currently equipped to disinfect. Design criteria are given in Table 1.

Table 1: Current Design Criteria Summary (Source: Robert Peccia & Associates, 1992)	
Facility Description:	
3-celled aerated facility, no disinfection capabilities.	
Construction Date: 1991	Modification Date: NA
Design Population: 1,700	Current Population: 1,594 (2000 Census)
Design Flow, Average (mgd): 0.255	Design Flow, Maximum Day (mgd): 0.943
Primary Cells: 2	Secondary Cells: 1
Number Aerated Cells: 3	Minimum Detention Time-System (days): 41
Design BOD Removal (%): unknown	Design BOD Load (lb/day): 315
Design SS Removal (%): unknown	Design SS Load (lb/day): 340
Influent Flow (mgd): 0.255	Source: Robert Peccia & Associates
Collection System Combined <input type="checkbox"/> Separate <input checked="" type="checkbox"/>	Estimated I/I: Planned for 2006
SSO Events (Y/N): none reported	Bypass Events (Y/N): none reported
Disinfection (Y/N): no	Type: NA
Discharge Method: Continuous	
Sludge Storage: NA	
Sludge Disposal: NA	Permit Number: NA

The Department has completed compliance inspections annually from 1990 through 1997, and more recently in 2003 and 2005. No permit violations were noted in either recent (post 2000) inspection. However, during both the 2003 and 2005 inspections, 4 of the 12 aerators were noted as being out of service.

The inspector collected a sample to be analyzed for biochemical oxygen demand (BOD₅) and total suspended solids (TSS) during the 2003 inspection. The BOD₅ value was 105

mg/L (the DMR reported value was 42 mg/L). The inspector determined that the BOD₅ value was not a violation. Rather, the inspector suggested the permittee consider sampling for carbonaceous biochemical oxygen demand (cBOD) to more correctly characterize the effluent oxygen demand. Neither a response from the permittee nor a follow-up on the recommendation from the Department are on file.

b. Effluent Characteristics

A summary of the 30-day average discharge, as reported in million gallons per day, is given in Table 2. The period of record (POR) is January 2001 through December 2005. Discharge to the Missouri River occurred once in January 2004.

Table 2: Summary of Discharge Data as mgd (Period of record: January 2001 through December 2005)					
Month	2001	2002	2003	2004	2005
	30-day Average	30-day Average	30-day Average	30-day Average	30-day Average
January	0.173	0.173	0.173	0.184 *	0.207
February	0.173	0.173	0.173	0.184	0.184
March	0.173	0.173	0.173	0.164	0.207
April	0.173	0.173	0.173	0.184	0.196
May	0.173	0.173	0.173	0.232	0.184
June	0.173	0.173	0.173	0.184	0.173
July	0.173	0.173	0.163	0.163	0.173
August	0.173	0.173	0.207	0.184	0.173
September	0.173	0.173	0.196	0.163	0.173
October	0.173	0.173	0.184	0.184	0.173
November	0.173	0.173	0.196	0.207	0.173
December	0.173	0.173	0.196	0.196	0.173
Minimum	0.173	0.173	0.163	0.163	0.173
Maximum	---	---	0.207	0.232	0.207
Footnote: * Indicates Discharge to Missouri River via Outfall 001					

The previous permit required monthly reporting for discharge flow, BOD₅, TSS, and nutrients. Pathogen monitoring was deemed unnecessary because of the high dilution rate of the Missouri River. Effective on December 1, 1998, the Department granted the permittee's request for a reduction in the nutrient monitoring requirements. As the facility had not discharged directly to the Missouri River, the request was granted. Results for the POR are presented in Table 3.

Table 3: Effluent Characteristics for the Period of Record January 2000 through December 2005							
Parameter	Location	Units	Previous Permit Limits (7-day / 30-day)	Minimum	Maximum	Average	Number of Samples
Flow, Daily Average	Effluent – Outfall 001	mgd	NA	0.184	--	--	1
	Effluent – Outfall 002	mgd	NA	0.163	0.232	0.179	59
BOD ₅	Effluent – Outfall 001	mg/L	45/30	17	--	--	1
	Effluent – Outfall 002	mg/L	45/30	6	91	21	58
	Effluent - Outfall 002	lbs/day	NA	8.6	149	32	57
TSS	Effluent – Outfall 001	mg/L	135/100	33	--	--	1
	Effluent – Outfall 002	mg/L	No limit	10	165	53.4	59
	Effluent – Outfall 002	lbs/day	NA	14.4	270	80	59
Fecal Coliform Bacteria	Effluent	#/100-mL	NA	16	--	--	1
TN	Effluent	mg/L	NA	10.79	14.97	12.88	2
TP	Effluent	mg/L	NA	2.24	3.22	2.73	2

Grab samples were collected by Department inspectors and analyzed for fecal coliform bacteria and nutrients, total nitrogen (TN) and total phosphorus (TP). One fecal coliform bacteria sample was collected in July 2005. The two nutrient samples were collected in April 2003 and July 2005.

Eleven reported BOD₅ results have been greater than the 30-day limit of 30 mg/L. All of these exceedences have occurred during the spring, March through May. Violation letters were sent for violations during April 2002, April 2003, April 2004, and March through May 2005. Response letters on file from the permittee state that spring turn-over is the cause of the exceedences. None of the letters report that aerators were out of service or that, in anticipation of the known repetitive out-of-compliance conditions, operational changes were made.

III. Proposed Technology-Based Effluent Limits (TBEL)

Outfall 001 and 002

The Board of Environmental Review has adopted by reference 40 CFR 133 which sets minimum treatment requirements for secondary treatment or equivalent for publicly owned

treatment works (POTW) (ARM 17.30.1209). Secondary treatment is defined in terms of effluent quality as measured by BOD₅, TSS, percent removal of BOD₅ and TSS, and pH. National secondary treatment requirements are described in 40 CFR 133 and incorporated in to all municipal permits.

The secondary treatment requirement may be modified on a case-by-case basis for facilities that are eligible for treatment equivalent to secondary (TES, 40 CFR 133.101 (g)) for BOD₅, TSS, and percent removal. To determine if a facility is eligible for TES the facility must meet the requirements of 40 CFR 133.101(g), summarized as follows:

- 1) The 95th percentile of the 30-day BOD and TSS concentrations in a minimum 2-year period, excluding upsets, bypasses, operational errors and unusual conditions [40 CFR 133.101(f)] exceed the minimum levels established for secondary treatment requirement;
- 2) The treatment works utilize a trickling filter or waste stabilization pond; and,
- 3) The treatment works utilizes biological treatment that consistently achieves a 30-day average of at least 65 percent removal [40 CFR 133.101(k)].

In addition to these requirements, the modification may not contribute to an exceedence of water quality standards or exceed the limits established in a permit issued prior to April 29, 1993 unless the Department has completed a nonsignificance determination (See Part IV). Waste stabilization ponds may include common biological treatment systems such as facultative, aerated, or aerobic lagoons.

In addition to TES, permitting agencies may give special consideration to treatment works that employ waste stabilization ponds as the primary method for treating wastes and for system receiving less concentrated influent. Alternative State Requirements (ASR) may be applied as limits in a permit for a lagoon system if historic data indicate that the TES limits in cannot be achieved. The 30-day ASR for TSS in Montana is 100 mg/L and the 7-day limit is 135 mg/L.

Limits established in the previous permit applied the secondary treatment standard for BOD₅ and ASR for TSS (Table 3).

The proposed technology- based effluent limits are:

- 1) BOD₅ Limits: National secondary treatment requirements apply to effluent quality for both Outfall 001 and 002. The aerated facility was designed to meet national secondary limits and these were the limits applied in the last permit.

Seasonality is present in the data, with BOD₅ exceeding the 30-day average of 30mg/L in eight of the 15 monthly reporting periods for March through May. However, BOD₅ limits will not be relaxed. Using all data for the POR, the 95th percentile for BOD₅ is 42.7 mg/L. When the seasonal data are omitted (all March through May), the 95th percentile is 24.9 mg/L. Two recent MPDES compliance

inspections noted one-third of the aerators were out of service. Non-functional equipment, as needed for proper operation and maintenance, cannot be overlooked in assessing the BOD₅ violations concurring with spring turn-over.

- 2) TSS limits: ASR applies to both Outfall 001 and 002 from the effective date of the permit through December 31, 2009. Treatment equivalent to secondary requirements will apply from January 1, 2010 through the duration of the permit.

Self-monitoring data for Outfall 002 show erratic and unpredictable TSS values, with an upward trend over the POR. Using all data for the POR, the 95th percentile for the self-reported TSS monitoring data is 98.6 mg/L. Thirty-two of 59 monthly reporting periods for the POR are greater than 45-mg/L, or the TES limit. Values that are greater than 45 mg/L, or TES for a 30-day period, are common throughout the year and seasonality in the data could not be extrapolated.

Effluent data will be reassessed during the next permit cycle, along with records to assess proper operation and maintenance, in order to determine continued eligibility relaxed TSS limits. Federal regulations given in 40 CFR 133.101(g) states that facilities are eligible for treatment equivalent to secondary treatment if TSS effluent concentration “consistently achievable through proper operation and maintenance” exceed the minimum level of the effluent quality set forth by national secondary treatment requirements. Proper operation and maintenance is defined in the MDPES permit in Part III.E.

Table 4. Proposed Interim Technology-Based Effluent Limits (Outfall 001 & 002) – effective through December 31, 2009					
Parameter	Concentration (mg/L) ⁽¹⁾		Load (lbs/day) ⁽¹⁾		Rationale
	7-day Average	30-day Average	7-day Average Load	30-day Average Load	
BOD ₅	45	30	96	64	40 CFR 133.102 (a)
TSS	135	100	284	213	40 CFR 133.105 (d)
pH (s.u.)	Within the range of 6.0 to 9.0				40 CFR 133.102 (c)
BOD ₅ % removal	85%				40 CFR 133.102 (a)
TSS % removal	65%				40 CFR 133.105 (b)
1. See Part V. of the permit for explanation of terms.					

Table 5. Proposed Final Technology-Based Effluent Limits (Outfall 001 & 002) – effective January 1, 2010					
Parameter	Concentration (mg/L) ⁽¹⁾		Load (lbs/day) ⁽¹⁾		Rationale
	7-day Average	30-day Average	7-day Average Load	30-day Average Load	
BOD ₅	45	30	96	64	40 CFR 133.102 (a)
TSS	65	45	138	96	40 CFR 133.105 (b)
pH (s.u.)	Within the range of 6.0 to 9.0				40 CFR 133.102 (c)
BOD ₅ % removal	85%				40 CFR 133.102 (a)
TSS % removal	65%				40 CFR 133.105 (b)
1. See Part V. of the permit for explanation of terms.					

Load limits were calculated as follows:

$$\text{Load (lb/day)} = \text{Design Flow (mgd)} \times \text{Concentration (mg/L)} \times \text{Conversion Factor (8.34)}.$$

BOD:

$$\begin{array}{llll} \text{7-d} & \text{Load} = & 0.255 \text{ mgd} \times 45 \text{ mg/L} \times 8.34 & = & 96 \text{ lbs/day} \\ \text{30-d} & \text{Load} = & 0.255 \text{ mgd} \times 30 \text{ mg/L} \times 8.34 & = & 64 \text{ lbs/day} \end{array}$$

TSS, applicable through December 31, 2009 (based on ASR):

$$\begin{array}{llll} \text{7-d} & \text{Load} = & 0.255 \text{ mgd} \times 135 \text{ mg/L} \times 8.34 & = & 287 \text{ lbs/day} \\ \text{30-d} & \text{Load} = & 0.255 \text{ mgd} \times 100 \text{ mg/L} \times 8.34 & = & 213 \text{ lbs/day} \end{array}$$

TSS, effective January 1, 2010 (based on TES):

$$\begin{array}{llll} \text{7-d} & \text{Load} = & 0.255 \text{ mgd} \times 65 \text{ mg/L} \times 8.34 & = & 138 \text{ lbs/day} \\ \text{30-d} & \text{Load} = & 0.255 \text{ mgd} \times 45 \text{ mg/L} \times 8.34 & = & 96 \text{ lbs/day} \end{array}$$

Nondegradation

The permit does not authorize a new or increased discharge, as defined in ARM 17.30.702(16), and therefore is not subject to the criteria in ARM 17.30.715(1).

Load allocations are given in Table 6. The previous permit calculated allocated loads based on the facility design. These allocations define baseline allocated loads for the facility. Any increase above this amount is subject to the provisions of Montana's Nondegradation Policy 75-5-303, MCA and ARM 17.30.705 *et seq.* Actual annual loads given in Table 5 were calculated from self-monitoring data.

Table 6: Allocated and actual average loads.						
Parameter	Allocated load (lbs/day)	Actual annual average load (lbs/day)				
		2001	2002	2003	2004	2005
BOD ₅	63.8	26.1	30.3	32.5	32.0	39.5
TSS	212.7	59.1	72.8	80.1	80.4	108.3
TN	47.6	NA	NA	NA	NA	NA
TP	11.9	NA	NA	NA	NA	NA
(NA) – “not applicable” as permittee was not required to monitor effluent for TN or TP.						

III. Water-Quality Based Effluent Limits

a. Receiving Water

Surface Water

The permittee has two options for wastewater discharge: directly to the Missouri River (Outfall 001); or via groundwater to the Missouri River from the infiltration pond (Outfall 002). The permittee has almost exclusively used the infiltration pond for disposal since the upgrade in 1991. The WWTF and discharges locations are in the 10030102 4th field HUC (hydraulic unit code), as defined by the United States Geological Survey (USGS).

At the point of the WWTF discharge, the Missouri River water-use classification is B-3 (ARM 17.30.610). Waters classified B-3 are suitable for drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming and recreation; growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply (ARM 17.30.625(1)).

The USGS maintains a flow gauging station on the Missouri River near Fort Benton (station: 06090800). River flow data has been collected at this site since 1890 to present. From 1901 to present, the annual seven-day ten year low flow (7Q10) is 2,410 cubic feet per second (cfs). The 7Q10 was calculated using DFLOW and the statistical results are included in Appendix A.

The section of the Missouri River that the WWTF discharges is on both the 1996 and 2004 303(d) list of impaired streams for the reach from Morony Dam to the Marias River (waterbody segment ID: MT41Q001_014). On the 1996 list, causes of impairment included metals, other inorganics, nutrients, siltation, flow alteration, and suspended solids. Probable sources of impairment were listed as agriculture (including irrigated land production and rangeland), stream bank modification, upstream impoundments, and natural sources. The 2004 303(d) list has algal growth/chlorophyll a, metals, nutrients, siltation, and thermal modifications. Probable sources of impairment are listed as industrial point source, agriculture, and/or hydromodification. A TMDL for this segment of the Missouri River has not yet been prepared.

Groundwater

Groundwater has classifications, beneficial uses, and water quality standards based on specific conductivity (SC). Data collected in May 1972 from two City owned wells approximately one mile southwest of the wastewater treatment facility had SC values of 1,340 $\mu\text{S}/\text{cm}$. ARM 17.30.1006(2) classifies groundwater with SC between 1,000 and 2,500 $\mu\text{S}/\text{cm}$ as Class II. Class II groundwater must be maintained so that the water is at least marginally suitable for: public and private water supplies; culinary and food processing purposes; irrigation of some agriculture crops; drinking water livestock and wildlife; and most commercial and industrial purposes. Human health standards for groundwater are provided in Department Circular DEQ-7 (February 2006).

The aquifer underlying the infiltration pond is unconfined Quaternary alluvium (DEQ Source Water Delineation and Assessment Report, 2004). Static water levels of local wells completed in the shallow, unconfined alluvial aquifer indicate that groundwater movement is to the river. Well information was obtained through the GWIC (Groundwater Information Center) database (available online: <http://mbmggwic.mtech.edu/>, July 2006). No monitoring wells have been installed by the permittee around the infiltration pond or the treatment facility.

Treated wastewater is discharged through a surface pipe into the infiltration pond at its southwestern corner. The infiltration pond was the unlined second facultative lagoon for the former treatment facility. When the facility was upgraded in 1991, the infiltration cell was not improved, biosolids were not removed, and the current vegetative species were not selected specifically for wetland purposes. Impacts to the local groundwater and/or the Missouri River from the remaining biosolids have not been investigated.

Engineering plan maps identify the bottom elevation of the infiltration pond as approximately seven feet lower than the top elevation of the present WWTF dikes (Robert Peccia and Associates, 1992). The Missouri River is approximately 15 feet lower in elevation than the top of the WWTF dikes. The bank of the Missouri River is approximately 175 feet from the edge of the WWTF and the eastern dike of the infiltration pond. The wetted surface area of the infiltration pond was approximated as 475 feet wide by 875 feet long by using color aerial photography provided by NRIS (Natural Resource Information System, website: <http://nris.mt.gov/interactive.html>, 2006).

b. Mixing Zone

Surface Water

Pursuant to ARM 17.30.505(1)(c), discharges from Outfalls 001 and 002 are considered to be existing sources for the purposes of establishing mixing zones. The previous permit defined a surface water mixing zone as 1.5 miles downstream of the discharge and the entire width of the river. The downstream boundary was identified as where the river

flowed into Section 1, T 32N, R 19E. The defined mixing zone was based on best professional judgment. Specific constituents that required a mixing zone were not identified in the previous permit.

The Montana Water Quality Act requires that mixing zones be the smallest practicable size, have minimal effects on water uses, and have definable boundaries (MCA 75-5-301(4)). While the past permit defined boundaries, it did not provide information to satisfy the other two requirements. The permittee did not request or apply for a mixing zone.

A standard surface water mixing zone will be applied to Outfall 001. ARM 17.30.516(1) states that a standard mixing zone may apply if a discharge to surface water is small in comparison to the volume of the receiving water or if the mixing zone is nearly instantaneous and the parameter(s) of concern will not threaten or impair existing uses. The dilution ratio of the receiving water to the design discharge is 6,400. ARM 17.30.516(3)(a) states that discharge limitations will be based on dilution with the 7Q10 when a facility design flow is less than one million gallons per day and a dilution ratio greater than 100:1 exists.

The length of a standard mixing zone must not exceed more than ½ the mixing width calculation as given in ARM 17.30.516(4)(a) or extend downstream from the point of discharge more than ten stream widths at 7Q10, whichever is more restrictive. Lacking information specific to the Missouri River at the outfall location, physical data obtained for the Missouri River at USGS gauging station 06090800 will be used to determine the standard mixing zone length for Outfall 001.

Equation 1 is given in ARM 17.30.516(4)(a) for calculating the “one-half mixing width”, $A_{1/2}$. A substitution was made for the lateral dispersion coefficient, L , to CDU , as defined in ARM 17.30.516(4)(b). Stream physical data were provided by the USGS at a flow of 2,320 cfs, which is approximately the value of the 7Q10 (2,410 cfs).

$$A_{1/2} = \frac{0.4 * (W / 2)^2 * V}{CDU} \quad \text{Equation 1}$$

Where:

- W = stream width = 446 feet
- V = velocity of the stream at 2,320 cfs = 1.13 feet/second
- C = channel irregularity factor = 0.1
- D = average water depth at 2,320 cfs = 1.5 feet
- U = $(32.2DS)^{1/2} = 0.155$
- S = channel slope = 0.0005

The resulting mixing zone distance from Equation 1 is 964,269 feet (182 miles). The resultant distance exceeds ten times the stream width. The stream width was estimated using aerial photos and is approximated as 420 feet at the point of discharge. Therefore, the mixing distance downstream is 4,200 feet.

Groundwater

Treated effluent discharged at Outfall 002 infiltrates to the groundwater, which flows towards the Missouri River. While wells completed in the unconfined alluvium show groundwater flow is to the river, the bearing and point of intersection with the Missouri River are undefined. The Department has not granted a mixing zone for a discharge to groundwater.

c. Proposed Water Quality-Based Effluent Limits

Permits are required to include water quality-based effluent limits (WQBELs) when technology-based effluent limits are not adequate to protect water quality standards (40 CFR 122.44, ARM 17.30.1344). ARM 17.30.637(2) states that no wastes may be discharged that can reasonably be expected to violate any standard. Pollutants typically present in domestic POTW effluent that may exceed water quality standards include *Escherichia coli* (*E. coli*) bacteria, low levels of dissolved oxygen (DO), total residual chlorine when used to control pathogens, and nutrients, including nitrate plus nitrite as nitrogen and/or total ammonia. Numeric standards for surface water and groundwater are given in Department Circular DEQ-7 (February 2006), ARM 17.30.625, and ARM 17.30.1006(2).

***Escherichia coli* (*E. coli*) Limits** – At present, pathogen data does not exist for the wastewater facility. The facility does not have the capacity to disinfect. Treated effluent discharged to the Missouri River must meet the *E. coli* standards prior to mixing with the receiving water.

The standard for *E. coli* for the Missouri River applies year-round. The standards applicable to the receiving surface water are:

- 1) April 1 through October 31, of each year, the geometric mean number of the microbial species *E. coli* must not exceed 126 colony forming units (cfu) per 100 milliliters (ml), nor are 10% of the total samples during any 30-day period to exceed 252 cfu per 100 ml (Draft ARM 17.30.625(2)(a)(i)); and
- 2) November 1 through March 31, of each year, the mean number of *E. coli* organisms should not exceed 630 cfu per 100 ml and 10% of the samples during any 30-day period may not exceed 1,260 cfu per 100 ml (Draft ARM 17.30.625(2)(a)).

Total Residual Chlorine – The present facility does not have the capability to disinfect.

For Outfall 001, the total residual chlorine effluent limit will be 0.019 mg/L, should the permittee opt to upgrade to chlorine disinfection of the effluent. The effluent limit is the acute aquatic life standard and the limit meets the requirements of ARM 17.30.637(1), which states that discharges of pollutants cannot create concentrations that are toxic to aquatic life.

Analytical methods require chlorine samples to be analyzed immediately (40 CFR 136). Therefore, the permittee must analyze, on-site, total residual chlorine using a chlorine meter and approved method. The method must achieve a minimum detection level of 0.1 mg/l. Sampling of effluent with analytical results less than 0.1 mg/l is considered in compliance with the chlorine limit. If ultraviolet disinfection (UV) is utilized, final limits for chlorine will not apply.

Total Ammonia -Ammonia standards for surface water are pH and temperature dependant. The standards had to be calculated following the procedures outlined in the Department Circular WQB-7 (January 2004). Ammonia standards are further defined as acute one-hour average (CMC) and chronic 30-day average (CCC) criterion. The fishery present and associated life stages are also taken into consideration for ammonia standard calculations. The reach of the Missouri River is warm-water fishery, based on the water-use classification (B-3). Early life stages are presumed present.

Ambient pH and water temperature data were available for the Missouri River through USGS gauging station 06090800. Data for pH were collected from July 1969 through August 1986. Water temperature data have been collected from July 1969 to the present.

Using the pH and water temperature data, seasonal standards for the Missouri River were calculated. The seasons used are summer, from April 1 through October 31, and winter, from November 1 though March 31. The acute limits, or CMC, were calculated using the 95th percentile for pH. The CCC was calculated using the 75th percentile for the pH and assumed water temperature. Total ammonia standard results are presented in Table 7.

Table 7: Ammonia standard calculations (DEQ, 2006).						
Condition	Period ⁽¹⁾	Salmonids Present	Early Life Stages Present	Ambient Condition		Water Quality Standard ⁽⁴⁾
				pH	Temperature °C	
Acute	Annual	No	NA	8.7 ⁽²⁾	NA	2.20
Chronic	Winter	NA	Yes	8.3 ⁽³⁾	4.6 ⁽³⁾	1.52
Chronic	Summer	NA	Yes	8.5 ⁽³⁾	18.9 ⁽³⁾	0.82
NA – Not Applicable Footnotes: (1) Winter is defined as November 1 through March 31 and summer as April 1 through October 31. (2) Based on 95 th percentile of annual data. (3) Based on 75 th percentile of values in the applicable period. (4) Based on Department Circular DEQ7 (February 2006)						

The permittee did not collect ammonia samples as part of the past self-monitoring. Effluent monitoring for total ammonia will be required monitoring in this permit. Too many unknown variables remain for the calculation of reasonable potential to exceed the standard from either outfall

Nitrate plus Nitrite as nitrogen (NO_{2/3}) – Circular DEQ-7 lists surface water and groundwater standards for NO_{2/3} as nitrogen (N) as 10 mg/L. These standards are human health standards. Aerated lagoons may have effluent NO_{2/3} levels that would require a mixing zone.

Effluent NO_{2/3} data are lacking to determine if reasonable potential exists to exceed either/both surface water or groundwater standards.

Total Nitrogen (TN) and Total Phosphorus (TP) – The Missouri River is listed as impaired by nutrients in the reach where the POTW discharges. Municipal point sources have not been identified as probable sources of impairment on either the 1996 or 2004 303(d) list. Effluent data are lacking to establish limits based for TN and TP.

Dissolved Oxygen – Freshwater aquatic life standards are characterized by the fishery (cold- or warm-water) and by the presence or absence of fish early life stages. Standards are further defined based on a time frame and required DO levels. Classification states this waterbody is a warm-water fishery and all life stages are assumed to be present.

Secondary treatment standards are in effect and will protect the receiving water. Typically, facilities that provide significant removal of organic material, as measured by BOD₅, do not require effluent limits for DO.

Whole Effluent Toxicity (WET) Limits - ARM 17.30.637(2)(d) prohibits discharges to state waters that would create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life. The Department may require WET testing based on criteria listed in ARM 17.30.1322(4)(j), which includes permittees with design flows greater than 1 mgd, POTWs with pretreatment programs, or other instances including variability of pollutants based on the treatment, dilution of the effluent in the receiving water, and/or receiving stream characteristics, including possible water quality impairment.

The lagoon provides significant detention time for biological treatment. Its design flow is less than 1 mgd. No significant industrial contributors are known to be in Fort Benton, nor does the City have a pretreatment program. WET testing is not necessary in this permit cycle.

IV. Proposed Effluent Limits

- a. Outfall 001 and 002 Interim Limits – applicable through December 31, 2009

Parameter	Units	Limit		
		Monthly Average ⁽¹⁾	Weekly Average ⁽¹⁾	Daily Maximum ⁽¹⁾
BOD ₅	mg/L	30	45	--
	lbs/day	64	96	--
BOD ₅ Removal	%	85	--	--
TSS	mg/L	100	135	--
	lbs/day	213	287	--
TSS Removal	%	65	--	--
Footnotes:				
1. See Definition section at end of permit for explanation of terms.				

b. Outfall 001 and 002 Proposed Final Limits – applicable January 1, 2010

Parameter	Units	Limit		
		Monthly Average ⁽¹⁾	Weekly Average ⁽¹⁾	Daily Maximum ⁽¹⁾
BOD ₅	mg/L	30	45	--
	lbs/day	64	96	--
BOD ₅ Removal	%	85	--	--
TSS	mg/L	45	65	--
	lbs/day	96	138	--
TSS Removal	%	64	--	--
<i>E. coli</i> – Summer ^{2, 3}	CFU/100-mL	126	--	252
<i>E. coli</i> – Winter ^{2, 3}	CFU/100-mL	630	--	1,260
Total Residual Chlorine ⁴	mg/L	0.011	--	0.019
Footnotes: 1. See Definition section at end of permit for explanation of terms. 2. Based on geometric mean of samples collected during reporting period. 3. Summer is defined as April 1 through October 31; winter is defined as November 1 through March 31. 4. Minimum level for Total Residual Chlorine (TRC) is 0.10 mg/L. For compliance purposes, sample less than this value shall be determined to be in compliance with this limit.				

V. Monitoring Requirements

a. Outfall 001 and Outfall 002

Due the record of noncompliance with BOD₅ and TSS technology-based treatment requirements, weekly effluent monitoring is required.

The receiving water is listed as being impaired from metals on the 2004 303(d) list. The permittee will be required to monitor the effluent annually for metals.

The permittee will monitor effluent discharge flow rate and quality at the V-notch weir in the effluent control structure. Influent samples will be collected from the influent manhole located near the first cell of the lagoon facility.

Monitoring Requirements – Outfall 001 and 002				
Parameter	Unit	Sample Location	Sample Frequency	Sample Type ¹
Flow	mgd	Effluent	1/Week	Instantaneous
5-Day Biological Oxygen Demand (BOD ₅)	mg/L	Influent ⁷	1/Month	Composite
	mg/L	Effluent	1/Week	Grab
	% Removal ²	NA	1/Month	Calculated
	lbs/day	Effluent	1/Month	Calculated
Total Suspended Solids (TSS)	mg/L	Influent ⁷	1/Month	Composite
	mg/L	Effluent	1/Week	Grab
	% Removal ²	NA	1/Month	Calculated
	lbs/day	Effluent	1/Month	Calculated
pH	s.u.	Effluent	1/Month	Instantaneous
Temperature	°C	Effluent	1/Month	Instantaneous
<i>E. coli</i>	No./100ml	Effluent	1/Month	Grab
Oil and Grease ³	mg/L	Effluent	1/Quarter	Grab
Total Ammonia, as N	mg/L	Effluent	1/Quarter	Grab
Nitrate + Nitrite, as N	mg/L	Effluent	1/Quarter	Grab
Kjeldahl Nitrogen, Total, as N	mg/L	Effluent	1/Quarter	Grab
Total Nitrogen, as N ⁴	mg/L	NA	1/Quarter	Calculated
	lbs/day	NA	1/Quarter	Calculated
Total Phosphorus, as P	mg/L	Effluent	1/Quarter	Grab
	lbs/day	NA	1/Quarter	Calculated
Total Dissolved Solids (TDS)	mg/L	Effluent	1/Quarter	Grab
Dissolved Oxygen	mg/L	Effluent	1/Quarter	Grab
Footnotes: 1. See Definition section at end of permit for explanation of terms. 2. See narrative discussion in this section of permit for additional details. 3. Use EPA Method 1664, Revision A: N-Hexane Extractable Material (HEM), or equivalent. 4. Calculated as the sum of Nitrate + Nitrite (as N) and Total Kjeldahl Nitrogen (as N) concentrations.				

Monitoring Requirements (Continued)				
Parameter	Unit	Sample Frequency	Sample Type ¹	ML
Arsenic, Total Recoverable ²	µg/L	1/Year	Composite	1.0
Cadmium, Total Recoverable ²	µg/L	1/Year	Composite	0.1
Chromium, Total Recoverable ²	µg/L	1/Year	Composite	10.1
Copper, Total Recoverable ²	µg/L	1/Year	Composite	1.0
Lead, Total Recoverable ²	µg/L	1/Year	Composite	1.0
Mercury, Total Recoverable ²	µg/L	1/Year	Composite	0.1
Selenium, Total Recoverable ²	µg/L	1/Year	Composite	1.0
Silver, Total Recoverable ²	µg/L	1/Year	Composite	1.0
Zinc, Total Recoverable ²	µg/L	1/Year	Composite	10.0
Hardness (as CaCO ₃)	mg/L	1/Year	Grab	10.0
Footnotes:				
1. See Definitions section at end of permit for explanation of terms.				
2. Metals shall be analyzed as total recoverable, use EPA Method (Section) 4.1.4 [EPA 600/4-79-020, March 1983] or equivalent.				

VI. Special Conditions

ARM 17.30.1342 (8) requires that the permittee furnish to the Department, within a reasonable time, any information to determine compliance with this permit. The basis of the special conditions addressed here are: to better define the local hydrogeology in respect to the infiltration pond; and determine the need for and implement disinfection of treated wastewater.

- a. Groundwater Characterization – The infiltration pond is part of the disposal system where the permittee discharges pollutants via groundwater to the Missouri River. The permittee has not submitted groundwater specific information with permit renewal applications. Past MPDES permits have defined the discharge as being hydrologically connected to the Missouri River and thus, a surface water discharge through the groundwater. Data are lacking that characterize the groundwater, the pollutants present in the discharge, and the effects of biosolids that were left in the second facultative cell during the last facility upgrade.

Information needed, but not necessarily limited to, include:

- Monitoring well network – at least one up-gradient well and two down-gradient wells;
- Ambient groundwater characteristics – static water level, specific conductivity (SC), total dissolved solids (TDS), water temperature, pH, chloride, *E. coil*,

total Kjeldahl nitrogen (TKN), total ammonia as nitrogen, nitrate+nitrite as nitrogen, total organic carbon (TOC);

- Local hydrogeology characterization – depth to groundwater, depth to bedrock, depth to shallowest impermeable geologic strata, direction of groundwater flow.
- Groundwater mixing zone characteristics – hydraulic gradient, hydraulic conductivity, maximum width of source perpendicular to the direction of groundwater flow, depth, width, and length of mixing zone, distance from source to facility property boundary, volume of the groundwater in the mixing zone.

Authority:

1. Part I. A. “Description of discharge point and mixing zone” of the MPDES permit, which comes from information provided by the permittee during the renewal application process. Specifically, fulfilling the requirements of ARM 17.30.1322(6)(a), which describes the activities conducted by the permittee that requires a MPDES permit.
2. ARM 17.30.1345(1) states that all permit effluent limitations, standards, and prohibitions must be established for each outfall or discharge point of the permittee facility.

Timeframe:

1. Submit a groundwater monitoring plan and schedule to the Department post marked by June 30, 2009. The plan should include including a description of the mixing zone, well location, and well completion details.
2. Install all monitoring wells by June 30, 2010.
3. Begin quarterly groundwater monitoring of groundwater from monitoring wells July 1, 2010. Characteristics that must be sampled are static water level, specific conductivity (SC), total dissolved solids (TDS), water temperature, pH, chloride, *E. coil*, total Kjeldahl nitrogen (TKN), total ammonia as nitrogen, nitrate+nitrite as nitrogen, and total organic carbon (TOC).
4. Annually (by January 28, 2008, 2009, 2010, and 2011) the permittee will report the Department milestones met in characterizing the groundwater.

Condition	Timeframe
Submit groundwater monitoring plan and schedule	June 30, 2009
Install monitoring wells	June 30, 2010
Begin monthly groundwater sampling	July 1, 2010
Annual reports documenting milestones	Jan. 28, 2008, 2009, 2010, 2011

- b. Effluent pathogen limits – effluent pathogen data are lacking for the existing facility and the ability of the WWTF to treat pathogens is unknown. The facility does not have disinfection capabilities.

Authority:

1. MPDES Part III.D. “Duty to Mitigate” and ARM 17.30.1342(4) which state that the permittee will take all reasonable steps to minimize or prevent any discharge which has a reasonable likelihood of adversely affecting human health or the environment.
2. ARM 17.30.637 (1) which states that state surface water must be free from substances attributable to municipal discharges that will create concentrations which are toxic or harmful to humans. ARM 17.30.637(2) states that no wastes may be discharged such that the waste will violate or can be reasonably be expected to violate any of the standards.

Timeframe:

1. By January 28, 2010, the permittee must submit a plan for meeting effluent limits for pathogens as measured by *E. coli*.
2. Effluent limits for *E. coli* will be effective with the next permit issuance.
3. By January 28, 2008, 2009, and 2011, the permittee will report the Department milestones met in meeting *E. coli* effluent limits.

Condition	Timeframe
Annual reports documenting milestones	Jan. 28, 2008, 2009, 2011
Submit plan for meeting final effluent limits	Jan. 28, 2010

VII. Compliance Schedule

Not applicable at this time.

VIII. Other

Molloy Determination

On September 21, 2000, a U.S. District Judge issued an order stating that until all necessary total maximum daily loads (TMDLs) under Section 303(d) of the Clean Water Act are established for a particular water quality limited segment (WQLS), the State is not to issue any new permits or increases under the MPDES program. The order was issued in the lawsuit Friends of the Wild Swan v. U.S. EPA, et al. (CV 97-35-M-DWM), District of Montana and Missoula Division. The renewal of this permit does not conflict with Judge Molloy’s order because this is not a new or increased discharge under MPDES.

IX. Information Sources

40 CFR, Parts 122, 136, July 1, 2000.

Montana Department of Environmental Quality (DEQ). Circular DEQ7, Montana Numeric Water Quality Standards. February 2006.

DEQ. ARM (Administrative Rules of Montana) 17.30.601-670. Montana Surface Water Quality Standards. February 2006.

DEQ. ARM 17.30.701-717. Nondegradation of Water Quality. June 1996.

DEQ. ARM 17.30.1201-1209. Montana Pollutant Discharge Elimination System (MPDES) Standards. March 2003.

DEQ. ARM 17.30.1301-1387. MPDES Permits. March 2006.

DEQ. Montana 303(d) List. A Compilation of Impaired and Threatened Water bodies in Need of Water Quality Restoration. Part A. Water Quality Assessment Results. 2002.

GWIC. (Montana Groundwater Information Database). Available online at: <http://mbmggwic.mtech.edu/>. Accessed: July 19, 2006

MCA (Montana Code Annotated), Title 75-5-101 *et seq.*, “Montana Water Quality Act”. 2003.

NRIS. Website address: <http://nr.is.state.mt.us/topofinder2/default.asp>, accessed July 18, 2006.

Robert Peccia and Associates. “Operation and Maintenance Manual”. Approved April 1992.

USGS (United States Geological Survey). Water Resources for Montana. Available online at: <http://mt.water.usgs.gov/>. Accessed: July 4, 2006.

Prepared by: Rebecca Ridenour
Date: December 2006



Figure 1: Fort Benton POTW site; facility is located NE of the town site. (NRIS, 2006)

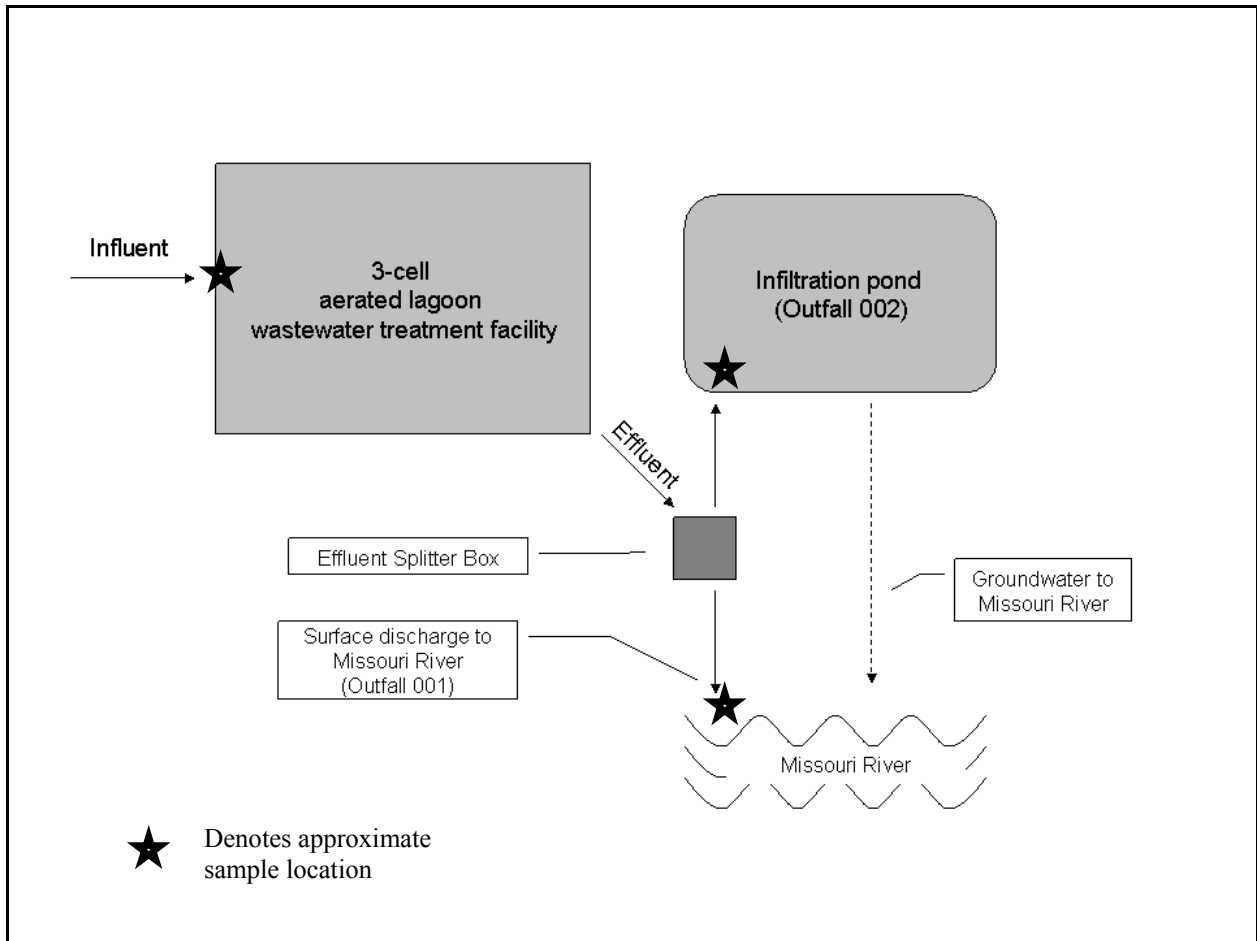


Figure 2: City of Fort Benton facility line drawing (DEQ, 2006).

APPENDIX A

Statistical output from DFLOW3 for the Milk Missouri River at Fort Benton (USGS station 6090800), using USGS station data from 1902-2004. 7Q10 calculated for the City of Fort Benton MPDES permit MT0021601, November 6, 2006.

Gage	Period	Days in Record	Zero/missing	1B3	Percentile	Excure. Per 3 yrs	7Q10	Percentile	Excur. Per 3 yrs	Harmonic	Percentile
6090800 Missouri River at Fort Benton	1902-2004	37,620	None	1.9E3	0.31%	0.99	2,400	1.15	1.55	5.56E3	47.81%